

I claim

1. A method for extending the range of an RF communication system using a high voltage (HV) cable and neutral cable as the transmission channel, where the
5 HV cable is simultaneously carrying low-frequency current, the method comprising the steps of:

transmitting over the transmission channel, an RF signal from a central location downstream towards a remote location;

10 splitting the HV cable into an upstream RF segment and a downstream RF segment where the segments are RF isolated and low-frequency connected;

receiving the RF signal from the upstream RF segment at a first port of a reconditioner;

15 directing a reconditioned RF signal from a second port of the reconditioning device to the downstream RF segment of the HV cable.

2. The apparatus of claim 1 wherein the RF isolation is provided by a low pass filter comprising blocking inductors and at least one capacitor for RF attenuation.

20 3. The apparatus of claim 1 wherein the reconditioner is a repeater.

4. The apparatus of claim 1 wherein the reconditioner is a regenerator.

25 5. The apparatus of claim 1 wherein the directing step utilizes a series capacitor and inductor arrangement with a connection going from the juncture of the capacitor and inductor to the reconditioner.

6. The apparatus of claim 1 wherein the steps are adapted for two-way communication.

7. A method for extending the range of an RF communication system using a high voltage cable as the transmission channel comprising the steps of:

forming a first RF segment and a second RF segment of the HV cable;

coupling the segments to ports on a reconditioning device; and

5 reconditioning RF signals from each of the segments.

8. The apparatus of claim 7 wherein the forming step is provided by a low pass filter.

10 9. The apparatus of claim 7 wherein the coupling step is provided by a lightning arrester in series with a ferrite clamped on a cable.

10. The apparatus of claim 7 wherein the reconditioning step includes amplification and equalization.

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11. The apparatus of claim 7 wherein the reconditioning step is provided by a regenerator having at least demodulation, decoding, encoding and modulation.

12. An apparatus for isolating RF signals in a broadband data communication system having a HV cable and a neutral cable as a communication channel, the apparatus comprising:

a first RF signal on the HV cable;

a second RF signal on the HV cable;

an isolation filter for electrically isolating the first RF signal from the

25 second RF signal, the isolation filter comprising a ladder network of one or more ferrites clamped on the HV cable and one or more capacitors connected between the HV cable and the neutral cable;

RF couplers on each side of the isolation filter for coupling the RF signals to ports of a reconditioner.

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13. The apparatus of claim 12 wherein the isolation filter is a symmetric filter.

14. The apparatus of claim 12 wherein the one or more capacitors is a power factor correction capacitor.

5 15. The apparatus of claim 12 wherein the RF signals are greater than 20
MHz.

16. The apparatus of claim 12 wherein the reconditioner has a processor for monitoring voltage levels within the reconditioner.

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17. The apparatus of claim 12 wherein the reconditioner is a two-way repeater.

18. The apparatus of claim 12 wherein the reconditioner is a two-way regenerator.

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19. A reconditioning circuit for a PLCC where an high voltage cable and a neutral are the communication channel and where the high voltage cable simultaneously transport low frequency current for electrical power and communication signals for broadband data service, the reconditioning circuit

20 comprising:

a low-pass filter;

two RF couplers connected to opposite ends of the low-pass filter;

a reconditioner connected between the other ends of the couplers, the reconditioner comprising at least amplifiers for boosting the communication

25 signals strength.

20. The apparatus of claim 19 wherein the reconditioner is a two-way regenerator.

30 21. The apparatus of claim 19 wherein the reconditioner is a two-way repeater.

22. An apparatus for RF by-passing a power factor correction capacitor on a high voltage cable and directing communication signals to a reconditioner, the apparatus comprising:

5 a plurality of ferrites clamped on the capacitor cable coupling the high voltage cable to the capacitor; and
couplers connected to the high voltage cable and the reconditioner.

10 23. The apparatus of claim 22 wherein the reconditioner is a two-way regenerator.

24. The apparatus of claim 22 wherein the reconditioner is a two-way repeater.

15 25. An apparatus distributing RF communication signals from a HV cable to and from a plurality of branch circuits, the apparatus comprising:

 a plurality of low pass filters for RF isolating the HV cable from each of the branch circuits;

20 a plurality of couplers where one coupler is connected to the HV cable and to each of the branch circuits, and

 a reconditioner having a HV cable port and a branch port for each of the branch circuits, the reconditioner having amplifiers and filters for directing and conditioning the communication signals.

25 26. The apparatus of claim 25 wherein the reconditioner is a regenerator.

27. The apparatus of claim 25 wherein the reconditioner is a repeater.

30 28. The apparatus of claim 25 wherein the RF frequencies are in the band from 20 MHz to 200 MHz.

29. An apparatus coupling a communication signal from a transmission cable feeding a distribution substation to a distribution cable exiting the distribution substation, the apparatus comprising:

5 a transmission blocking filter for blocking the communication signal from
entering the distribution substation by way of the transmission cable;

a transmission coupler connected to the transmission cable:

a distribution blocking filter for blocking RF energy from entering the distribution cable by way of the distribution cable;

a distribution coupler connected to the distribution cable; and

10 a reconditioner having ports connected to the couplers, the reconditioner comprising directional couplers and amplifiers.

30. The apparatus of claim 29 wherein the reconditioner is a regenerator

15 31. The apparatus of claim 29 wherein the reconditioner is a repeater.

32. An apparatus for coupling a communication signal on an RF coaxial cable to HV cable for upstream and downstream communication, the apparatus comprising:

20 a low pass filter for isolating the segmenting the HV cable to a downstream side and an upstream side:

a reconditioner having a coaxial port for receiving the coaxial cable and two HV cable ports, and

two couplers for coupling the HV cable ports to each side of the HV cable.

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33. The apparatus of claim 32 wherein the reconditioner is a regenerator.

34. The apparatus of claim 32 wherein the reconditioner is a repeater.

35. A repeater for receiving and sending communication signals to an upstream segment and a downstream segment of a HV cable, the repeater comprising:

an arrangement of downstream elements comprising a downstream
5 preamplifier, equalizer, AGC amplifier and power amplifier where the downstream elements receives a downstream communication from the upstream segment and transmits a signal to the downstream segment;

an arrangement of upstream elements comprising an upstream
10 preamplifier, equalizer, AGC amplifier and power amplifier where the upstream elements receive an upstream communication signal from the downstream segment and transmits a signal to the upstream segment; and

direction couplers for directing the communication signals.

36. The repeater of claim 35 further comprising a control processor for
15 monitoring and adjusting signal levels within the repeater.

37. The processor of claim 36 further having a means for transferring information to a headend device.

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38. A regenerator for receiving and sending communication signals to an upstream segment and a downstream segment of a HV cable, the regenerator comprising:

- an arrangement of downstream elements comprising a downstream demodulator, equalizer, decoder, encoder, modulator and power amplifier where the downstream elements receive a downstream communication signal from the upstream segment and transmits a signal to the downstream segment;
- an arrangement of upstream elements comprising an upstream demodulator, equalizer, decoder, encoder, modulator and power amplifier where the upstream elements receive a upstream communication signal from the downstream segment and transmits a signal to the upstream segment; and
- direction couplers for directing the communication signals.

39. The repeater of claim 38 further comprising a control processor for monitoring and adjusting signal levels and for determining bit error rates within the regenerator.

40. The processor of claim 39 further having a means for transferring information to a headend device.

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